

**ROLLING FORWARD
THE REGULATORY ASSET BASES
OF THE
ELECTRICITY AND GAS INDUSTRIES**

DISCUSSION PAPER

**INDEPENDENT PRICING AND REGULATORY TRIBUNAL
OF NEW SOUTH WALES**

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Submissions

Public involvement is an important element of the Tribunal's processes. The Tribunal therefore invites submissions from interested parties to all of its investigations.

Submissions should have regard to the specific issues that have been raised. There is no standard format for preparation of submissions, but reference should be made to relevant issues papers and interim reports. Submissions should be made in writing and if they exceed 15 pages in length, should also be provided in computer disk in word processor, PDF or spreadsheet format.

The closing date for submissions is 12 February 1999.

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Such a claim for confidentiality should be clearly noted in a prominent position on the front page of the submission.

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Public information about the Tribunal's activities

Information about the role and current activities of the Tribunal, including copies of latest reports and submissions can be found on the Tribunal's website at www.ipart.nsw.gov.au

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ABBREVIATIONS & ACRONYMS

AARR	aggregate annual revenue requirement
ACCC	Australian Competition and Consumer Commission
AGL	Australian Gas Light Company
Capex	capital expenditure
CAPM	capital asset pricing model
COAG	Council of Australian Governments
CPI	consumer price index
CPI-X	consumer price index less an efficiency factor
DAC	depreciated actual cost
DORC	depreciated optimised replacement cost
DV	deprival value
GSN	Great Southern Networks
IPART	Independent Pricing and Regulatory Tribunal (the Tribunal)
LIS	line in the sand
MAR	maximum allowable revenue
MMC	Monopolies and Mergers Commission (UK)
NPV	net present value
NSP	network service provider
ODRC	optimised depreciated replacement cost
ODV	optimised deprival value
OFFER	Office of the Electricity Regulator (UK)
OFGAS	Office of Gas Supply (UK)
OFWAT	Office of Water Supply (UK)
Opex	operating expenditure
ORG	Office of the Regulator General (VIC)
PCR	price cap regulation
PV	present value of future income streams
RAB	regulatory asset base
RAT	recoverable amount test
RPI	retail price index (UK)
SCARM	Standing Committee on Agriculture and Resource Management of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ)
WACC	weighted average cost of capital

1 INTRODUCTION

In determining prices and assessing access revenues for the electricity and gas industries, the Independent Pricing and Regulatory Tribunal (the Tribunal) is guided by the statutory framework within which each industry operates. The framework is embodied in a range of laws and industry codes applying at state and national levels. Section 15 of the *Independent Pricing and Regulatory Tribunal Act 1992 (IPART Act)* specifies the criteria the Tribunal must consider in determining prices under its Act.

Electricity prices (ie transmission, distribution and retail prices for franchise customers), are currently determined by the Tribunal under s15 of the *IPART Act*. In the future, the Tribunal will be required to determine electricity distribution prices in accordance with the National Electricity Code. In approving gas access prices, the Tribunal must assess proposals in accordance with the National Access Code. This code came into effect in August 1998 with the enactment of the *Gas Pipelines Access (NSW) Act 1998*.

In defining a revenue requirement (whether through a price or a revenue cap) the Tribunal is required under the electricity and gas codes to assess the future cash flow needs of an organisation. The revenue must be sufficient to cover the operations, maintenance and administration expenses of the entity, plus an appropriate return of and on capital.

There is no universal acceptance of a particular approach to setting the initial regulatory asset base. Once the initial regulatory asset value has been established, the issue of how that value is to be rolled forward arises. The solutions to these matters are interdependent.

This discussion paper examines the issues associated with rolling forward the asset bases of regulated entities. The Tribunal is seeking to foster discussion on the issues raised in this paper.

The term 'roll-forward' refers to how the initial capital base, once determined, is adjusted over time to reflect changes in the value of productive capability of the existing asset base and new investment in the business.

Section 1 of this paper outlines the broad regulatory context within which the issues are to be considered. Section 2 discusses issues pertaining to the asset base. Section 3 discusses in detail issues relevant to asset roll forward.

This paper does not address the issue of how the initial regulatory asset base should be determined. Rather, this paper outlines the issues involved in deciding how to roll forward the regulatory asset base once it has been determined.

1.1 Consultation process

How the Tribunal rolls forward an asset base is an important issue for all the Tribunal's regulated entities. The Tribunal is currently undertaking reviews to determine access prices in the gas industry (AGL, Great Southern Network and Albury Gas Company). As well as reviewing gas prices, the Tribunal is reviewing electricity prices in NSW¹. Given the number of reviews currently in process, the Tribunal has decided to initiate discussion of the issues for the energy industry in general. The Tribunal hopes this approach will help to achieve consistency as far as possible. The close linkages between gas and electricity make a consistent approach highly desirable. However, the variations between the national codes may make this more difficult to achieve. Obviously, the roll forward of the asset base in each industry must have regard to:

- the specific legislative arrangements that govern the regulation of that industry
- the specific circumstances of the industry and utility.

To assist the Tribunal to adopt a policy on asset roll forward, overseas practices were examined. Utility regulation in the USA is based on rate of return regulation. Thus, every time a rate case is conducted, the asset base is assessed to determine a fair return on the investment by the utility, subject to a 'used and required to be used' test.² The experience in the UK, where regulation is based on CPI-X style incentive regulation, was also considered. The Tribunal commissioned PricewaterhouseCoopers in London to review how the UK regulators roll forward the regulatory asset value. The resulting report is attached as Appendix 2.

This discussion paper will form the basis of consultation with the regulated entities and interested parties. The Tribunal seeks submissions on this discussion paper. If any submissions contain information that is considered to be confidential, they should be clearly marked CONFIDENTIAL.

Submissions should be sent to the Tribunal by no later than 15 February 1999. Submissions should be addressed to:

<p><i>Asset Base Roll Forward</i> Mr John Dulley General Manager, Secretariat Independent Pricing and Regulatory Tribunal PO Box Q290 QVB Post Office Sydney NSW 1230</p>

¹ The electricity review currently underway is pursuant to section 12A of the IPART Act. The Tribunal is to prepare a report in two parts on the appropriate pricing of transmission and distribution, and franchise supply. The report's recommendations are to be based on the application of the National Electricity Law and the National Electricity Code with the objectives of protecting the long term commercial value of the affected businesses for the benefit of the State's taxpayers, and the long term interests of the customers of these businesses.

² Any investment should be prudent, ie exclude unwise or extravagant investments. 'Used and required to be used' is a term that is often used as a measure of the prudence of the investment.

1.2 Regulatory framework

1.2.1 Electricity

The transmission and distribution of electricity (and certain ancillary services such as connection, disconnection, and inspection) have been declared 'government monopoly services' under section 4 of the *IPART Act*. Government monopoly services are subject to pricing determinations by the Independent Pricing and Regulatory Tribunal. The Tribunal's electricity pricing determinations to date have been made under section 11 of the *IPART Act*. This section of the *IPART Act* allows the Tribunal to conduct investigations and to report on the pricing of a government monopoly service where that service:

- is supplied by a government agency specified in schedule 1 of the *IPART Act*; and
- has been declared to be a 'government monopoly service' under s4 of the *IPART Act*.

When conducting an inquiry under section 11, the Tribunal must consider the matters listed in section 15(1) of the *IPART Act*. This section lists the matters which the Tribunal must consider in setting maximum prices for the regulated entities. Matters listed in section 15 include: the efficient cost of providing services, the protection of consumers from the abuses of monopoly power, the appropriate rate of return on assets, standards of quality, reliability and safety, the need to maintain ecologically sustainable development, and the social impact of determinations.

The National Electricity (NSW) Act 1997 was proclaimed in December 1998. It removes the six NSW electricity distribution businesses from schedule 1 of the *IPART Act*, but requires IPART to continue to regulate those businesses as if they were listed in schedule 1 of the *IPART Act* until 31 December 2000. Concurrently, the National Electricity Code (electricity code) contains a derogation which requires IPART to regulate the prices of distribution network services under the *IPART Act* until 31 December 2000. Thereafter, IPART, as the appointed jurisdictional regulator, will regulate these services under the provisions of chapter 6 of the electricity code.

The proclaimed sections of the *National Electricity (NSW) Act* remove TransGrid from schedule 1 of the *IPART Act*, but allow IPART to continue to regulate TransGrid as if it was listed in schedule 1 of the *IPART Act* until 30 June 1999. After that date, NSW derogations from the Code provide for regulation to pass to the Australian Competition and Consumer Commission (ACCC) under the electricity code.

1.2.2 Gas

In approving gas access prices, the Tribunal must assess proposals in accordance with the National Access Code which came into effect in August 1998. In assessing a proposed Access Arrangement, the Tribunal must take the following matters into account³:

- (a) the Service Provider's legitimate business interests and investment in the Covered Pipeline;
- (b) firm and binding contractual obligations of the Service Provider or other persons (or both) already using the Covered Pipeline;
- (c) the operational and technical requirements necessary for the safe and reliable operation of the Covered Pipeline;
- (d) the economically efficient operation of the Covered Pipeline;
- (e) the public interest, including the public interest in having competition in markets (whether or not in Australia);

³ See section 2.24 of the Code.

- (f) the interests of Users and Prospective Users;
- (g) any other matters that the Relevant Regulator considers are relevant.

Chapter 8 of this code sets out principles for the determination of prices for access to gas pipelines, including principles for:

- establishing the initial capital base
- valuing investment in new facilities
- reducing the capital base where assets cease to contribute, or make a reduced contribution, to the delivery of services.

These provisions are discussed in more detail in the relevant sections below.

1.2.3 Regulatory objectives

The Tribunal prefers incentive regulation to the more traditional cost of service (or rate of return) regulation. Incentive regulation offers the regulated entities inducements to improve their long term efficiency at a rate faster than the benchmark levels set by the regulator. It rewards the entity with higher profits, if it does better than the benchmarks. However, it penalises the entity with reduced profits if it fails to achieve those benchmarks. The key characteristics of 'incentive regulation' are:

- regulation of prices or revenues, rather than profits
- use of medium term price or revenue controls, rather than annual reviews
- incentives for the entity to pursue efficiency gains by providing an opportunity retain the benefits of improved profitability for a period of time.

In general terms, this means that revenues are set by the regulator at a level that has regard to both the efficient costs of providing the services, and the utility's current efficiency level. This allows for a sustainable commercial revenue stream which provides a fair and reasonable rate of return to owners on efficient investment in the system.

The *IPART Act* and the electricity and gas codes require the Tribunal to balance the needs of the regulated entities and the consumers. The codes and the *IPART Act* express this balancing of interests differently. Ultimately, the Tribunal must use its judgement, consistent with the relevant legislation, to strike a balance between providing the scope for the entity to achieve appropriate financial performance, and serving the interests of consumers through the long run commercial provision of services at prices that reflect efficient costs. At the same time, standards of service and impact on the environment need to be considered. These matters also require regulatory judgement.

Thus, the Tribunal favours a framework that, subject to the requirements of the relevant laws and codes:

- enhances economic efficiency and competition
- encourages, through incentive based regulation, ongoing efficiency gains to be made by the regulated entity, thereby delivering lower prices to customers
- provides appropriate signals for efficient new investments
- includes an assessment of operational and capital expenditure

- reflects an analysis of various financial indicators, including but not limited to the rate of return, in assessing commercial performance
- considers the impact on consumers and service standards
- provides opportunities for consideration of the implications of pricing policies for the protection of the environment
- reduces the compliance and administrative costs of regulation.

The principles of good regulation require that regulatory decisions be transparent, objective and credible. In a regulated environment the actions of the regulator could influence the assessment of risk and expected returns by introducing elements of uncertainty and risk. Regulatory uncertainty weakens existing incentives for efficient behaviour and may create additional disincentives. Regulated firms may require a higher rate of return to justify investment in jurisdictions that are subject to greater regulatory uncertainty.⁴

A key issue to consider is the extent to which current determinations can or should bind the actions of future regulators. This has legal and policy implications. A determination applies to a specific time period (the review period). Within the review period, details of the regulatory contract can be clearly set out. However, many of the asset roll forward issues relate to the subsequent review. The form of regulatory commitment that can be made in order to ensure the effectiveness of the incentives offered will need to be explored. The opportunity to improve the efficiency of regulation should not be sacrificed to contractual rigidity.

In the recent gas inquiries conducted by IPART, the Office of the Regulator General in Victoria (ORG) and the ACCC, there was considerable discussion of regulatory risk and redundant assets. This discussion paper explores the relationship between rolling forward the asset base and regulatory risk.

Although a regulator cannot legally bind his or her successors, statements about the general approach to be taken may carry some weight. Equally, regulators can build confidence in regulatory regimes by not behaving opportunistically and by honouring past commitments. Credibility and confidence requires that regulators ensure that commitments entered into are capable of being honoured, perhaps in changed circumstances in the future.

Importantly, the commitment of the regulated entities to regulatory agreements is equally important for the credibility of the regulatory process.

1.3 Relationship between the annual revenue requirement and the asset base

In defining a revenue requirement (whether through a price or a revenue cap), inter alia, the Tribunal assesses the future cashflow needs of the organisation. That cash requirement needs to be sufficient to cover the operations, maintenance and administration expenses of the entity, plus any return of and on capital. This can be represented by the formula:⁵

⁴ However, this is not to suggest that the optimal outcome is to minimise uncertainty. A number of risks, including some investment related risks are best managed by the utility. The objective is to assign risks appropriately and avoid creation of additional risks.

⁵ Alternative approaches which are not 'cost-linked' are discussed in *Regulation of Electricity Network Service Providers: Incentives and Principles for Regulation*, Discussion Paper No 32, January 1999.

$$R = O + M + A + C + R$$

Where R = revenue requirement

Non-Capital Costs:
O = operations expenses
M = maintenance expenses
A = administration expenses

Capital costs:
C = return of capital
R = return on capital

As shown, in the formula above the revenue requirement does not include capital expenditure explicitly. Capital expenditure to maintain or augment the asset base is funded from the return of capital, injections of equity, and borrowings (or other financing approaches). Ultimately, prudent new capital expenditure is included in the asset base. Return of capital, commonly termed 'depreciation', may be more appropriately described as 'maintenance of capital' if a renewals approach is adopted.

Capital-related costs of regulated gas and electricity companies can be in the order of up to 70 per cent of the total annual revenue requirements. The treatment of capital related issues such as the roll forward of the asset base can have a major impact on the utility.

2 THE ASSET BASE

2.1 Determining the initial regulatory asset base

Fundamental to the measurement of capital costs in the revenue requirement is an assessment of the utility's capital investment in the system. The Tribunal has not endorsed any particular asset valuation methodology. **Economic analysis provides important input when valuing sunk assets for regulation. However, it does not suggest that one specific methodology is unambiguously superior to another. Rather, economic principles provide lower and upper bounds.** Within these bounds, there is discretion for regulatory judgement. Furthermore, the Tribunal is of the view that asset valuation issues must be considered with regard to the overall profitability of the infrastructure business, sustainable cash flows of the business, as shown by the use of a range of cash-based financial indicators, and equity considerations. The extent of any under-building or over-building ('gold plating') of assets should also be considered. On a number of occasions, the Tribunal has stated that it does not endorse any single asset valuation methodology, including depreciated optimised replacement cost (DORC), for the purpose of determining the sustainable revenue requirement of a regulated utility.

The requirements for valuing the initial asset base in accordance with the gas and electricity codes are outlined below.

2.1.1 Gas code requirements

When a reference tariff is first proposed for a reference service provided by a covered pipeline that was in existence at the commencement of the code, the following factors should be considered in establishing the initial capital base (section 8.10):

- (a) The value that would result from taking the actual capital cost of the Covered Pipeline and subtracting the accumulated depreciation for those assets charged to Users (or thought to have been charged to Users) prior to the commencement of the Code;
- (b) The value that would result from applying the “depreciated optimised replacement cost” methodology in valuing the Covered Pipeline;
- (c) The value that would result from applying other well recognised asset valuation methodologies in valuing the Covered Pipeline;
- (d) The advantages and disadvantages of each valuation methodology applied under paragraphs (a), (b) and (c);
- (e) International best practice of Pipelines in comparable situations and the impact on the international competitiveness of energy consuming industries;
- (f) The basis on which Tariffs have been (or appear to have been) set in the past, the economic depreciation of the Covered Pipeline, and the historical returns to the Service Provider from the Covered Pipeline;
- (g) The reasonable expectations of persons under the regulatory regime that applied to the Pipeline prior to the commencement of the Code;
- (h) The impact on the economically efficient utilisation of gas resources;
- (i) The comparability with the cost structure of new Pipelines that may compete with the Pipeline in question (for example, a Pipeline that may by-pass some or all of the Pipeline in question);
- (j) The price paid for any asset recently purchased by the Service Provider and the circumstances of that purchase; and
- (k) Any other factors that the Relevant Regulator considers relevant.

The code does not specify any particular asset valuation methodology. Instead, it suggests that the initial capital base should normally lie between depreciated actual cost (DAC) and depreciated optimised replacement cost (DORC). Moreover, Section 2.24 of the code which gives criteria for overall acceptance or rejection of an undertaking is also relevant.

2.1.2 Electricity code requirements

The electricity code distinguishes between:

- the valuation of assets in service before 1 July 1999 ('sunk assets') and
- the valuation of assets brought into service after 1 July 1999 or the revaluation of 'sunk assets'.

In regard to sunk assets, Clause 6.10.3(e)(5) of the code provides that the jurisdictional regulator shall "provide a fair and reasonable risk adjusted cash flow rate of return on efficient investment [where sunk assets] are valued at a value determined by in Jurisdictional Regulatory or consistent with the regulatory asset base established in the participating jurisdiction".

Other aspects of the objectives and principles set out in the code may bear upon the determination of the asset base. However, the code does not provide specific guidance on the methodology for the initial valuation of sunk assets.

Clause 6.10.3 of the National Electricity Code states that “the valuation of assets brought into service after 1 July 1999 ('new assets'), any subsequent revaluation of any new assets and any subsequent revaluation of assets existing and generally in service on 1 July 1999 is to be undertaken on a basis to be determined by the Jurisdictional Regulator”. Clause 6.10.3(e)(5) lists matters to be considered by the Jurisdictional Regulator in reaching a decision on any subsequent distribution network asset revaluations:⁶

6.10.3 The regime under which the revenues of *Distribution Network Owners* and *Distribution Network Service Providers* (as appropriate) are to be regulated is to be administered by the *Jurisdictional Regulators* in accordance with the following principles:

(e) The regulatory regime to be administered by the *Jurisdictional Regulator* must be consistent with the objectives outlined in clause 6.10.2 and must also have regard to the need to:

(5) provide a fair and reasonable risk-adjusted cash flow rate of return to *Distribution Network Owners* on efficient investment given efficient operating and maintenance practices on the part of the *Distribution Network Owners* where: ...

(iii) ... any subsequent revaluation of any new assets and any subsequent revaluation of assets existing and generally in service on 1 July 1999 is to be undertaken on a basis to be determined by the *Jurisdictional Regulator*. In determining the basis of asset valuation to be used, the *Jurisdictional Regulator* must have regard to:

A the agreement of the Council of Australian Governments of 19 August 1994, that *deprival value* should be the preferred approach to valuing *network* assets;

B any subsequent relevant decisions of the Council of Australian Governments; and

C such other matters reasonably required to ensure consistency with the objectives specified in clause 6.10.2;

(iv) benchmark returns to be established by the *Jurisdictional Regulator* are to be consistent with the method of valuation of new assets and revaluation, if any, of existing assets and consistent with achievement of a commercial economic return on efficient investment.

The electricity code provides for the jurisdictional regulator to exercise discretion. It requires only that in valuing new assets and revaluing sunk assets the jurisdictional regulator **have regard to** the CoAG agreement which states that *deprival value* should be a preferred approach to asset valuation. The jurisdictional regulator may decide which valuation method to adopt.

2.1.3 Past determinations

An example of the Tribunal's approach to asset valuation is the 1996 Electricity Pricing Determination. In this instance, the Tribunal used a present value analysis of revenues to estimate asset values. The analysis was based on a 20 per cent reduction in revenues derived from the Tribunal's 1994 Determination. By combining this with assumptions about wholesale prices and retail margins, the Tribunal derived revenue caps for the distributors. From these revenue caps, the Tribunal conducted a present value analysis, (the recoverable amount test, or 'RAT') and cross-checked the results against a DORC valuation. This result was then used to form a view as to the approximate value of the infrastructure assets. This value, together with an estimate of the value of past capital contributions by customers, was used to derive the initial asset base.

⁶ National Electricity Code, Version 2.2. A similar clause relates to revaluation of transmission assets. See Clause 6.2.3(d)(4)(iv)(A).

The Tribunal's draft determination on GSN's Wagga Wagga gas system had regard to a number of different approaches to the valuation of assets in assessing the initial capital base. Reference points included estimates of depreciated actual cost, DORC and ODV.

Table 1 summarises how asset values have been determined for the electricity and gas sectors in NSW. **However, these asset values have not yet been deemed formally to be the regulatory asset base.**

Table 1 Asset values

Electricity	Gas
Network – aligned to ODV or Line in the Sand Value (LIS - present value of future income streams) – \$5,581 million, 29 February 1996.	<p>AGL – Present value of the forecast revenue stream for the gas distribution business using a nominal post tax return of 9.5% - \$1.2 billion (optimised later to \$1,185m) July 1997.</p> <p>GSN (draft) – After considering a feasible range of values under different asset valuation methodologies - \$28m (see Draft Decision 98-6).</p>

The potential for further reviews of the asset base could increase the level of regulatory risk. This may need to be reflected in the calculation of the rate of return. Under the gas code there will be limited scope to revise the opening asset base. The final determination on access to the GSN gas network will set the opening asset base for the Wagga Wagga gas system.

However, under the electricity code the jurisdictional regulator has the scope to revisit asset values. It is noted that in its issues paper for the regulation of transmission revenues,⁷ the ACCC has expressed an initial preference to revalue the assets under the electricity code on the basis of optimised deprival value. This could necessitate optimisation of the asset base every five years; ie each regulatory period. A question for consideration is whether it would be possible under the code to establish an initial regulatory asset base and then to apply an indexation factor to it each year. This would mirror the approach adopted by ACCC and ORG in the Victorian gas determinations and would not require revaluations based on DORC.

2.2 What does the asset base represent?

In considering the revenue requirement and the roll-forward of the asset base, it is essential to clarify what the initial regulatory asset base represents. The approach adopted for the initial asset valuation, and the subsequent income required to generate a required rate of return on those assets, will be influenced by the view of the nature of the asset base.

The question which arises is whether the regulatory asset base represents shareholder financial investments in the firm (ie the maintenance of the financial equity of the business in real terms), or the physical assets of the firm (ie the ability of the enterprise to maintain

⁷ *Regulation of Transmission Revenues, Issues Paper, May 1998, Australian Competition and Consumer Commission, p 12.*

production of the same level of goods and services over time). **Importantly, once the regulator has decided whether the asset base represents financial investments in the firm or the physical assets of the firm, regulatory decisions on return of capital, indexation, redundant or stranded assets should be consistent with this view of the regulatory asset base (RAB).**

The amount included for return of capital will depend on whether a financial capital or physical capital concept is adopted. Under the financial capital concept the amount will represent the sum required to preserve the purchasing power of the shareholders' investment. Under the physical capital concept return of capital represents the amount of the amortisation of the sum required to replace (or renew) the existing asset stock as and when required. In some cases the two may be equivalent, but they may vary significantly from each other.

Under the physical capacity view, it could be argued that customer funded assets contribute to the ability of the firm to maintain the same level of goods and services and hence, should be included in the return of capital calculation. Moreover, customer funded assets will eventually need to be renewed or replaced. A financial capital view of the RAB would exclude customer funded assets from the regulatory asset base when determining the revenue requirement because it is not part of the shareholder's investment.

The Tribunal invites comments on the appropriate treatment of customer funded assets under the physical and financial views of the regulatory asset base.

The asset base on which the return is to be calculated will also vary for the two concepts. Under the financial capital concept, the actual monetary investment could be adjusted for changes in the general purchasing power of the dollar. Under the physical capacity concept, the capital base will vary with the required replacement expenditure.

UK utility regulators have typically followed a financial equity approach to setting price caps. The regulatory asset bases in the UK are considered to represent shareholder financial investments in the firm, rather than the physical assets or operating capability of the firm. This view is reflected in:

- the deeming of initial regulatory asset bases in relation to enterprise values following privatisation
- the indexation of regulatory values by the retail prices index (RPI), rather than by asset-specific indices.

In the UK, the initial financial capital base for the electricity and water sectors was established by taking the market value of equity in the immediate post-privatisation period. In the case of gas there was a greater lag in the reference to market values. This approach has not usually been available in Australia as regulators have been reluctant to endorse the apparently high values paid in trades sales. Experience in Australia suggests that proponents and regulators have chosen to establish an initial capital base consistent with the status quo in terms of prices and standards.

2.2.1 Advantages and disadvantages of the financial capital view of the asset base

Advantages of the financial capital view of the RAB are:

- Its simplicity. There is no requirement to value the replacement cost of specific assets or make adjustments for technical obsolescence.
- It ensures that the general purchasing power of the original investment is preserved, which is the relevant requirement from the investor viewpoint. The investor is not concerned so much with the specific physical assets of the entity, but with preserving the initial investment plus an appropriate return. This approach would realise a lower return, due to the reduction in risk associated with the investor's not bearing the risk of asset obsolescence and redundant assets.

The disadvantages of this view are:

- No link between the monetary and physical investment decisions.
- It may preserve the capital value regardless of technical obsolescence and inappropriate investments. In a competitive market, such action is punished by a diminution in value.

2.2.2 Advantages and disadvantages of the physical capacity view of the asset base

Advantages of the physical capacity view of the RAB are:

- It focuses on maintaining the productive capacity of the entity, that is, its ability to service customers.
- Adjustments can be made for technical obsolescence and poor investment decisions.

Disadvantages of this view are:

- The complexity of application and the opportunities for variations in interpretation.
- The cost of compliance checking and administrative overheads.
- Encouragement of over investment in physical assets including 'gold plating' - subject to the extent and effectiveness of 'optimisation sanctions'.

The Tribunal invites comments on whether the regulatory capital base represents:

- (i) the shareholder's financial investments in the firm, or***
- (ii) the physical assets of the firm ie the ability of an enterprise to maintain the same level of goods and services over time.***

3 ROLLING FORWARD THE ASSET BASE

3.1 Code requirements

3.1.1 Gas code

The gas code is quite prescriptive in relation to adjusting the asset base of a gas utility. Section 8.9 of the code states in part:

... the Capital Base at the commencement of each Access Arrangement Period after the first, **for the Cost of Service methodology**, is determined as:

- (a) the Capital Base at the start of the immediately preceding Access Arrangement Period; plus
- (b) the New Facilities Investment or Recoverable Portion (whichever is relevant) in the immediately preceding Access Arrangement Period (adjusted as relevant as a consequence of section 8.22 to allow for the differences between actual and forecast New Facilities Investment); less
- (c) Depreciation for the immediately preceding Access Arrangement Period; less
- (d) Redundant Capital identified prior to the commencement of that Access Arrangement Period,

and for the IRR or NPV methodology, is determined as:

- (e) the Residual Value assumed in the previous Access Arrangement Period (adjusted as relevant as a consequence of section 8.22 to allow for the differences between actual and forecast New Facilities Investment); less
- (f) Redundant Capital identified prior to the commencement of that Access Arrangement Period.

The gas code provides for the rolling forward of the capital base to be expressed as follows:

Regulatory capital base = Initial capital base + New facilities investments (excluding speculative investment) - Depreciation - Redundant capital

The provisions relating to the roll-forward of the asset base do not provide for the revaluation of the initial capital base. However, the overview to chapter 8 states that:

In addition, other methodologies that can be translated into one of these forms [of methodologies for determining total revenue] are acceptable (such as a method that provides a real rate of return on an inflation indexed capital base).

The code has specific provisions covering the treatment of:

- new facilities investment (section 8.15-8.17)
- speculative investment (section 8.19)
- capital contributions (section 8.23 and 8.24)
- redundant capital (section 8.27).

The code also provides guidance on dealing with forecast capital expenditure in the development of reference tariffs and the timing of recognising capital expenditure in the capital base.

Although the code does not specify indexation of depreciation and the capital base (ie existing assets and new facilities investment), the underlying principles allow for a return *of* and *on* capital over the life of a covered pipeline.

In its draft decision for GSN, the Tribunal concludes that the regulatory capital base should be indexed by the CPI. This is consistent with the concept of financial capital maintenance, that is, maintaining the value of the shareholder's investment.

Prudency test of investments

Under the gas code, actual new facilities investment must pass a 'prudent investment' test to be included in the capital base within the Access Arrangement period. The test specifies:

- 8.15 The Capital Base for a Covered Pipeline may be increased from the commencement of a new Access Arrangement Period to recognise additional capital costs incurred in constructing New Facilities for the purpose of providing Services.
- 8.16 The amount by which the Capital Base may be increased is the amount of the actual capital cost incurred (*New Facilities Investment*) provided that:
- (a) that amount does not exceed the amount that would be invested by a prudent Service Provider acting efficiently, in accordance with accepted good industry practice, and to achieve the lowest sustainable cost of delivering Services; and
 - (b) one of the following conditions is satisfied:
 - (i) the Anticipated Incremental Revenue generated by the New Facility exceeds the New Facilities Investment; or
 - (ii) the Service Provider and/or Users satisfy the Relevant Regulator that the New Facility has system-wide benefits that, in the Relevant Regulator's opinion, justify the approval of a higher Reference Tariff for all Users; or
 - (iii) the New Facility is necessary to maintain the safety, integrity or Contracted Capacity of Services.
- 8.17 For the purposes of administering 8.16(a), the Relevant Regulator must consider:
- (a) whether the New Facility exhibits economies of scale or scope and the increments in which Capacity can be added; and
 - (b) whether the lowest sustainable cost of delivering Services over a reasonable time frame may require the installation of a New Facility with Capacity sufficient to meet forecast sales of Services over that time frame.
- 8.18 A Reference Tariff Policy may, at the discretion of the Service Provider, state that the Service Provider will undertake New Facilities Investment that does not satisfy the requirements of section 8.16. If the Service Provider incurs such New Facilities Investment, the Capital Base may be increased by that part of the New Facilities Investment which does satisfy section 8.16 (the Recoverable Portion).

Under the code, forecast capital expenditure may be included in the determination of total revenue and reference tariffs, as follows:

- 8.20 ... Reference Tariffs may be determined on the basis of New Facilities Investment that is forecast to occur within the Access Arrangement period provided that the New Facilities Investment is reasonably expected to pass the requirements in section 8.16 when the New Facilities Investment is forecast to occur.

Speculative investment, redundant capital, uneconomic proportion of new investment

Section 8.27 of the gas code provides for, but does not require, mechanisms to adjust for redundant capital. Such mechanisms may provide for the removal of an amount from the capital base (redundant capital) for a covered pipeline to:

- ensure that assets which cease to contribute in any way to the delivery of services are not reflected in the capital base, and

- share costs associated with a decline in the volume of sales of services provided by means of the covered pipeline between the service provider and users.

Speculative investment (as defined in the Gas Code) cannot be included in the capital base. However, if over time, this investment (or part thereof) meets the prudence test, this expenditure (or part thereof) can be included in the capital base:

- 8.19 The Reference Tariff Policy may also provide that an amount in respect of the balance of the New Facilities Investment may subsequently be added to the Capital Base if at any time the type and volume of services provided using the increase in Capacity attributable to the New Facility change such that any part of the Speculative Investment Fund (as defined below) would then satisfy the requirements of section 8.16. The amount of the Speculative Investment Fund at any time is equal to:
- (a) the difference between the New Facilities Investment and the Recoverable Portion, less any amount the Service Provider notifies the Relevant Regulator (at time the expenditure is incurred) that it has elected to recover through a Surcharge under section 8.25 (Speculative Investment); plus
 - (b) an annual increase in that amount calculated on a compounded basis at a rate of return approved by the Relevant Regulator which rate of return may, but need not, be different from the rate of return implied in the Reference Tariff; less
 - (c) any part of the Speculative Investment Fund previously added to the Capital Base under this section 8.19.

The Tribunal notes the comment made in submissions to ACCC/ORG draft decisions that stranded cost (or redundant capital) exposure may lead to an increase in the investors' required rate of return.⁸ This is because such risks may not be captured in CAPM.

In a competitive market, enterprises have to face and manage the risk of stranded asset cost due to competition and technological advancement. Where assets are stranded as a result of poor investment decisions or adverse circumstances, a full commercial return on the investments will not be achieved. Whilst the Tribunal does not wish to create uncertainty, it believes it is not appropriate to shield natural monopolies from business risks. Striking the right balance is a key challenge for the regulator.

3.1.2 Electricity code

Unlike the gas code, the electricity code has no specific requirements for rolling forward the asset base.

3.2 General approach

Within the requirements of the electricity and gas codes, once the regulator has made a decision regarding whether the regulatory asset base represents *financial investments* in the firm or the *physical assets* of the firm, regulatory decisions on 'rolling forward' the asset base such as indexation, redundant or stranded assets and return of capital should be consistent with this decision. Table 2 summarises the implications of the financial and physical capital views of the regulatory asset base for these issues.

⁸ A commentary paper on regulatory risk prepared by Oxford Economic Research Associates on behalf of APIA, p 7.

Table 2 Comparison of financial investment and physical capacity views of the regulatory asset base

	Financial investment view	Physical capacity view
Return of capital	Represents a return of capital subscribed.	Represents a charge for replacing the assets.
Indexation	Yes, adjust for changes in general purchasing power of the dollar.	Accounted for via replacement expenditure.
Stranded or redundant assets	Not an integral part of approach.	Accounted for via periodic revaluations. Roll forward is then only an issue within a review period.
New assets	Investment to be added to the regulatory asset base.	Accounted for via periodic revaluations. Roll forward is then only an issue within a review period.

Particular issues for consideration under the *physical capacity* view of RAB include:

- How should return of capital be recognised (eg economic depreciation, renewals annuity);⁹ what value should be used (ie should return of capital be calculated on the deemed regulatory asset base, current cost of the assets, or the actual cost of the assets); what are the implications for regulatory accounts as against statutory accounts; and are any other adjustments required?
- The treatment of future capital expenditure on new assets within a regulatory period.

Particular issues for consideration under the *financial investment* view of RAB include the following:

- Should the components of the asset base be indexed for inflation, and if so by what method (eg general inflation index or asset specific index)?
- The treatment of future capital expenditure on new assets raises further difficulties:

⁹ These represent different approaches to measuring asset consumption. The general public often uses the term, 'depreciation' to describe a deterioration in physical condition, or the loss in value due to the passing of time or ageing. **Economic depreciation** is the change in the market value of an asset. In the absence of a market for the relevant asset, it may be approximated by the change in value of the asset's service potential during a particular year. On this basis it will be measured by the change in economic value (ie cash flow base) over the period. Economic depreciation differs from **accounting depreciation** which is based on accounting standards. To an accountant, the term 'depreciation' means a systematic allocation of the cost of an asset to the accounting periods in which the asset provides benefits to the entity. This allocation is designed to mirror the consumption of the service potential or economic benefits associated with an asset over its useful life, resulting from both use and obsolescence. The purpose of provisions in accounting is to ensure that the cost of the flow of services provided by capital assets is met in the price of the agency's services, rather than being to build up funds for the replacement of these assets. A common assumption of **renewals accounting** is that the system is in a steady state and annual expenditure on maintenance (or annuity provision) is sufficient to maintain the physical operating capability of the asset in perpetuity. More sophisticated assessments may require an analysis of investment lives, maintenance profiles over asset lives and replacement cycles. The renewals annuity is the amount charged to the operating statement each year which is sufficient to keep the entire system of infrastructure assets operating at the required level of effectiveness and therefore, at the same level of value.

- Which criteria should be used for including capital expenditure in the asset base?
- What is the appropriate timing for recognising capital expenditure in the asset base?
- Does the regulator sign off on capital expenditure ex ante or ex post? If ex ante, is this revisited during the regulatory period? What are the implications for capital efficiency?

Each option has significant implications in terms of the incentives and cashflows of regulated entities over time.

The method of rolling forward the asset base also has implications for the reconciliation of the regulated entities' accounting and regulatory financial statements and future asset values.

The following sections canvas these issues.

3.3 Return of capital

The following issues must be considered when determining the appropriate level of return of capital to be included in the revenue requirement:

- What does the asset base represent – financial investment or physical capacity?
- How should return of capital be calculated - renewals annuity -v- economic depreciation?
- On what asset value should return of capital be based?
- How should return of capital be profiled over time?

Whittington addresses the issue of depreciation as follows:

The issue of depreciation is quite simple, as long as we start from a clear view as to what depreciation is for. There are two views of depreciation: first, that it represents a return of capital subscribed; second, that it represents a charge for the replacement of assets consumed. The former view is consistent with the use of the RAB (Regulatory Asset Base) as a basis for assessing the investment **in** the firm, attributable to shareholders. The latter view is consistent with the use of the RAB as a measurement of the investment **by** the firm in real assets, and is the view implicit in current cost accounting. Both approaches to depreciation are relevant to particular problems. For the purpose of establishing an RAB for fixing the price cap, the return of capital approach seems to be the more relevant, because we are concerned with giving shareholders an adequate (but not excessive) return of (in the case of depreciation) and (in the case of profit) on the capital which they subscribed.¹⁰

The second view, that depreciation represents a charge for the replacement of assets consumed, suggests that depreciation should be calculated on the basis of the current cost of assets. According to this view, determining an annual depreciation charge on the basis of an estimate of the economic life and current cost of the asset provides an approximation to asset consumption. However, it is worth noting that this may not reflect the real value in current cost terms of the consumption of service delivery capacity. There are major difficulties in applying an economic concept of depreciation within the limitations imposed by accounting data that is produced to satisfy accounting standards.

Alternative approaches to return of capital are: condition based depreciation, and the determination of a renewals annuity under a renewal accounting concept. Under a condition based approach, the allowance for depreciation depends on the physical condition of the

¹⁰ Geoffrey Whittington, *Regulatory Asset Value and the Cost of Capital*, p 8.

asset. This is quantified by the amount of maintenance, refurbishment or renewal required to maintain the asset in serviceable condition. Infrastructure renewal accounting was first adopted by the UK water industry. The premise underlying renewal accounting is that infrastructure assets have infinite lives and that operating capacity can be maintained in perpetuity. It is therefore considered incorrect to depreciate infrastructure over a finite lifespan.

Under a renewals approach, an annual sum is set aside. The accumulated future value of this sum equates to the cashflow requirements of the organisation's maintenance and refurbishment program over a very long term time horizon, eg 30 years or more.

Both the depreciation and the renewals methods involve subjective assessments. The depreciation method relies on engineering estimates of actual or replacement costs and asset lives. The renewals approach depends on:

- engineering assessment of the condition of the system and individual assets
- engineering estimates of renewal expenditure that in turn is affected by the costs of replacing parts of the system.

A prerequisite for the adoption of the renewals approach is the development of comprehensive asset registers and long term asset management plans.

The Tribunal is interested in exploring further the use of a renewals approach for pricing purposes especially for long lived assets for which replacement is uncertain. The Tribunal seeks comments on the application of the renewals approach, and whether this approach is consistent with both the physical capacity and the financial investment views of the RAB.

3.3.1 Depreciation profile

The total revenue earned from the regulated assets consists of the depreciation charge and the allowed return on assets. Thus, the revenue profile over time is dependent on assumptions made regarding depreciation, in particular the depreciation profile. In assessing the overall capital recovery over the life of the asset, it is important to examine the combined outcome of depreciation and return on assets.

As is the practice in the UK, for example, depreciation can be based on either the current cost of the assets, or the regulated asset base itself.

Over the economic lives of assets, the present values of total revenues to investors are independent of their depreciation profile, provided that allowable revenues are calculated consistently on the net asset base throughout the period. However, there are significant differences in terms of the pattern of allowable revenue and hence, cashflows available to the utility to meet interest, debt repayment and capital expenditure.

King comments:

...for most assets the relevant incentives relate to initial investment, not to the ongoing relative use of the asset over time. In this situation the actual depreciation schedule is irrelevant so long as it does not give the owner incentives to scrap the asset before it is past its useful life. Changing the

depreciation schedule simply alters the flow of funds to the asset owner, but does not alter the present value of the investment project.¹¹

Further, King notes:

... altering the flow of allowed revenues will however alter the allowed prices over time and may have a significant effect on final good consumers.¹²

He continues:

It can be argued that depreciation schedules need to be tied to current replacement costs to ensure that,

1. There are sufficient funds available to replace the asset at the end of its useful life and
2. There are minimal “price shocks” to consumers.

The first of these arguments is clearly fallacious. The purpose of depreciation is not to allow the asset owner to raise capital internally for future investment projects. This is the function of the capital markets. When the current asset has finished its useful life, it will either be an economically sensible investment to replace the asset at that point in time or not. The existence of a pile of accumulated funds is irrelevant when considering the investment.

If the investment will not be able to yield an equivalent return to the next best option, then it should not be carried out using either existing or new funds. If the investment is profitable, then the money can be sourced from the capital market and internal funds are not required.¹³

Appendix 1 presents two simple numerical examples based on Whittington,¹⁴ showing how the allowable revenue profile varies depending on the depreciation profile that is adopted. The examples show that the net present value of the total revenue recovered is independent of the depreciation profile that is adopted, provided the return on capital is appropriately determined based on the net asset base (ie after depreciation). In both cases it is the RAB that is being depreciated.

Other factors being equal, it is to be expected that investors prefer a rapid return of capital or higher rates of depreciation. This might also have the effect of reducing the impact of the potential stranding of any assets. The adverse consequence of this is that it may have the flow on effect of higher prices for present users in comparison with later users. This would be unfair to current users who would be paying a higher than justified proportion of costs, creating intergenerational inequity. Furthermore, if investors’ capital is returned too soon, there is the possibility that they will, in effect, ‘take the money and run’, failing to maintain the full productive capacity of the system, or replacing capital assets prematurely if they expect to earn their cost of capital on replacement values.

If a physical capacity view of the RAB is taken, an allowance may need to be made in the regulated entity’s permitted revenue for the risk of stranded assets. The Tribunal’s preference is to allow for this by adjusting the utility’s allowed rate of return using regulatory judgment, rather than through the CAPM as some have argued. The Tribunal may be prepared to provide some guidance on the circumstances in which it is prepared to strand assets. This may limit the effect of stranded assets on the rate of return.

¹¹ King, S P. 1996. *Infrastructure Access: the case of electricity in Australia*, in *1996 Industry Economics Conference Proceedings*. Australian National University, Canberra.

¹² *ibid.*

¹³ *ibid.*

¹⁴ These examples are adapted from a recent draft paper entitled *Regulatory Asset Value and the Cost of Capital* by Geoffrey Whittington, Appendix 2.

Changing asset valuation methodologies midway may cause inequities between past and future customers. For instance, long term customers argue that switching from a historical cost basis to a revalued asset valuation, long term customers will be required to pay for both depreciation of the initial investment and the asset valuation increment.

Changing the depreciation profile midway leaves the utility indifferent in present value terms, but may cause inequities between past and future customers. For instance, extending the asset's depreciable life, will cause customers who used that asset in the early part of its service life to bear proportionately more depreciation than those who used the asset late in its service life.

Overall, the Tribunal considers that an appropriate approach is one which:

- generates a flatter cashflow pattern that is more likely to lead to stable prices over time
- allows the regulated entity to manage its business according to when capital expenditure is required
- has the least problem of inter-generational inequity.

With regard to the first point, utility infrastructure is composed of assets of different vintages and asset lives. This has the effect of smoothing prices over time. Thus, the effect of different depreciation profiles on the stability of average prices over time may be relatively small. This is most likely to be so if a particular asset valuation methodology is followed consistently. However, a shift between asset valuation methodologies may have a significant effect.

The Tribunal has examined overseas methods of dealing with regulatory depreciation. The US allows historical cost depreciation on the rate base using historical cost net book value (ie DAC). In the UK, the approaches adopted are:

- Electricity industry. In setting price controls, the regulator, OFFER, allows depreciation on the regulatory asset value of assets only. It allows all new capital expenditure to be added to the regulatory asset base. OFFER could disallow capital expenditure on the basis that it has been inefficiently incurred, but has not done so.¹⁵
- Water industry. The regulator, OFWAT, allows current cost depreciation/renewals. It allows the regulatory asset base to be enhanced in real terms only to the extent that investment exceeds the renewal charge, in respect of underground assets, or the depreciation charge, in respect of above ground assets.
- Gas industry. The 1997 Monopolies and Mergers Commission (MMC) report on the TransCo price control states that depreciation will be allowed on the regulatory value of assets only. It allows actual capital expenditure which has been incurred over the previous price control period to be added to the regulatory asset base. Depreciation is profiled according to TransCo's book depreciation, which is adjusted downwards to reflect the difference between regulatory value and book value. This is a change made in response to recognition of inconsistencies in the previous practice of allowing depreciation based on replacement costs.

In the UK, the different industry regulators have allowed different depreciation profiles for their respective industries to reflect the cashflow needs inherent to each sector.

¹⁵ T. Tutton. *Rolling forward the regulatory asset base in UK utility regulation*, p 7.

Where depreciation is adopted as a measure of return of capital, the Tribunal favours, in principle, the adoption of depreciation profiles based on the regulatory asset base. The Tribunal invites comments on this approach.

3.4 Indexation

'Indexation' refers to the procedure for adjusting the value of the asset base for the effect of inflation. The issue of indexation is related to the question of what the regulatory asset base represents. In the UK all regulators index the regulatory asset base in terms of the UK RPI, as opposed to asset-specific cost indices. This is consistent with the view that the regulatory asset base represents financial investment. This investment should therefore be tied to general price inflation in the economy.

In relation to the UK approach, Whittington comments:

In summary, by accepting a general index basis for restating the RAB, the MMC has adopted a method consistent with the view that the RAB represents a pool of shareholders' funds, rather than a collection of specific investments. The general index has the further advantage of simplicity and objectivity. Its use also removes the risks to shareholders, which would otherwise arise from inflation (if no price adjustment were made to the RAB), or from relative price changes (if price adjustments were based on a current cost index or specific prices). It might be expected that insuring shareholders against these risks would reduce the rate of return that they would require.¹⁶

For logical consistency, if a real rate of return is allowed on the value of the capital assets, the capital base and depreciation should be indexed.

The Tribunal is of the view that if the concept of financial investment of the RAB is followed, the regulatory asset base should be indexed by CPI. The Tribunal seeks comments on this or alternative approaches.

3.5 Stranded or redundant assets

As outlined above (see 3.3.1), Section 8.27 of the gas code provides the circumstances under which assets may be stranded.

The electricity code provides no such guidelines.

Stranding of assets (or redundant assets) is not an integral element of financial investment view of the RAB. However, under the physical capacity view, where assets are no longer in service or are not contributing to the operating capacity of an entity, ie are redundant, an adjustment to the asset base may be necessary. In North America the application of this process is often referred to by regulators as the 'used and required to be used' test.¹⁷

The 'used and required to be used' test includes a mechanism to remove, at the commencement of a review period, any assets that no longer contribute to the delivery of the service. It should also provide a mechanism to allow assets previously identified as being redundant to be added back to the capital base.

¹⁶ Whittington, G. *Regulatory Asset Value and the Cost of Capital*, p 7.

¹⁷ Variants of a 'used and required to be used' test are applied in many regulatory jurisdictions. In this paper, the phrase 'used and required to be used' is meant to be illustrative of some sort of prudence test.

It could be argued that providing a regulator with the opportunity to remove redundant capital increases the regulatory risk and a higher return is required to offset this. Whilst regulatory risk is a legitimate concern for a regulated entity, regulators need to have procedures in place to ensure that a regulated capital base includes only 'used and required to be used' assets. Avoiding such tests could allow the regulated entity to inflate its asset base. In particular, the Tribunal does not wish to allow a full commercial return on assets that are stranded as a result of poor investment decisions or adverse circumstances. However, UK and US experience suggests that it is rare, in practice for assets to be deemed to be stranded by the regulator. The probability of stranding may be still less for integrated network assets than for upstream production facilities or energy purchase contracts.

Despite the apparent rarity of asset stranding in practice, exposing the entity to a stronger redundant capital test shifts the risk from the customers to the firm. It may also have the desirable economic effect of improving the firm's asset management. To the degree that the firm bears a greater risk of redundant capital and stranded assets, the firm will take more care when making initial investments. To the degree that the approach imposes risks on the regulated entity, this should be reflected in the return on capital.

Regulators may be able to provide guidance through statements of regulatory intent and the like, thus providing some assurance to entities considering investment. It has been suggested that guidance such as that provided in ORG's final gas report may in fact reduce 'regulatory uncertainty'.

IPART is mindful that there are legal issues associated with statements binding future Tribunals. However, the Tribunal invites comments on the relationship between a regulator's ability to apply a 'used and required to be used' test, rate of return, and regulatory uncertainty.

It should also be noted that regular optimisation of the initial asset base may sit uncomfortably with the financial investment view of the RAB. However, it is noted that the UK regulators do not appear to have ruled out subsequent optimisation of the initial asset base, but have not yet exercised this option.

3.6 New assets

The regulatory approach should clearly state how new investment would be rolled into the existing asset base and how it would be treated over time. Without such a clear statement, regulatory risk may be greater, and may need to be considered in calculating the rate of return.

The major issue to be considered in relation to the inclusion of capital expenditure is what measure of new assets is appropriate to incorporate into the asset base at the commencement of the regulatory period. Should it be based on what the regulator considers is an appropriate level of forecast capital expenditure, or should it be the regulated entity's forecast its own capital expenditure?

The simplest approach would be to use actual expenditure since the previous review. However, this may encourage the entity to spend what has been allowed, knowing that it will earn a return and not seek to achieve efficiencies in capital expenditure. This may lead to 'gold plating'.

An alternative is to roll forward the projected capital expenditure for the review period. However, this would encourage the entity to inflate its capital expenditure forecasts. It may also encourage underspending on maintenance and replacement.

Problems can arise if:

- there is a lack of clear standards of service and clear relationship between capital expenditure and standards of service
- there is a lack of relevant information within the utility
- there is a lack of utility comparators for benchmarking efficient levels of capital expenditure
- the regulated entity does not have rigorous asset management planning
- the relationship between capital expenditure, operation expenditure, quality and standards of service is not well understood or direct.

As King has pointed out, two general types of problem arise from asymmetric information.¹⁸ First, there is the adverse selection issue. In relation to capital expenditure, usually the regulator will not accurately know the appropriate amount of capital expenditure required, and will rely on the regulated entity to supply this information. In this case, there may be incentives for the regulated entity to inflate the reported capital expenditure relative to the true value. Secondly, there is the issue of moral hazard. A regulated entity whose capital expenditure is monitored by a regulator will have little incentive to minimise its capital expenditure if this simply leads to a lower regulated return.

The approach adopted for including new assets should not provide the regulated entities with disincentives to invest or incentive to invest excessively.

3.6.1 Use of actual -v- expected capital expenditure

Once a regulatory period is completed, the regulator needs to decide whether the subsequent regulatory determination should adjust for actual capital expenditure in the regulatory period just completed. The approach adopted has implications for the incentives given to the utility in terms of providing capital expenditure information, and for capital efficiency. The approach also has implications for the sharing of gains from any actual capital efficiencies made. These issues are discussed more fully in a recently released Tribunal discussion paper on the form of regulation, efficiencies and benefit sharing¹⁹, as part of the electricity review.

Rather than simply accepting capital expenditure forecasts that the entity submits to it, the Tribunal will make an independent assessment of the projection. An example of this is the recent review commissioned by the Tribunal of the six electricity distributors and TransGrid's past and future capital expenditure programs²⁰.

There are three main options for including in the asset base capital expenditure during the previous regulatory period:

¹⁸ King, S. P. *Access Pricing, a discussion paper*. Government Pricing Tribunal of New South Wales, Research Paper No 3, February 1995, p 21.

¹⁹ A copy of this paper can be obtained from the Tribunal's website www.ipart.nsw.gov.au

²⁰ A copy of the capital expenditure review report can be obtained from IPART's website – www.ipart.nsw.gov.au

1. Roll forward the capital base during the period on the basis of actual capital expenditure. In this case there is no incentives for the entity to pursue efficiency in capital expenditure.²¹
2. Roll forward the capital base during the period on the basis of forecast capital expenditure at the start of the period and, at the end of the period, adjust the regulatory capital base to take account of the actual capital expenditure. In this case, during the period the service provider retains the return on the difference between projected and actual expenditure. This approach provides an incentive to inflate the projected capital expenditure, but constrain actual expenditure.
3. Roll forward the capital base at each price review on the basis of projected capital expenditure during the previous period. The entity retains the return on the difference between actual and projected expenditure during the subsequent (second) period. During the following (third) period, actual expenditure replaces forecast.

Implicit in each of these cases is that forecast expenditure is greater than actual expenditure. Although this may normally be the case, it may not necessarily be so.

The Tribunal considers that the second or third approach provides a reasonable balance between protecting the interests of users, and providing the service provider with good incentives for efficiency in capital expenditure. The success of the second and third approaches depends on the ability of the regulator to review the firm's forecasts and reduce the scope for 'gaming'. The main differences between the two approaches are:

- the length of time for which the firm retains the difference between forecast and actual capital expenditure and, so the incentive to improve efficiency
- the complexity of implementation.

To reduce over-estimation by the regulated utilities, this approach should be accompanied by an independent assessment of capital expenditure at each major review.

In the case of BG Transco in the UK, the industry regulator chose the option of a partial backward looking adjustment. Under this approach, the NPV of the revenue allowed in respect of a proportion of capital under spending (against assumptions made at the previous price review) is deducted from the NPV of revenue which would otherwise be allowed under the new price control. Partial clawback was chosen on the basis that:

- total backward looking adjustment would discourage efficient capital expenditure
- zero backward looking adjustment would encourage companies to over-estimate capital expenditure requirements
- in the electricity and gas industries it is more difficult to specify the 'outputs' of particular capital programs and, therefore monitor those outputs, rather than the expenditure itself.

The primary disadvantage of this approach is that it reduces the incentives to pursue efficiency in capital expenditure - perhaps to the long term detriment of customers. If applied asymmetrically by the regulator it may also increase regulatory uncertainty and require higher risk premiums.

²¹ Except to the extent that the threat of future optimisation (which can apply under all three options for the treatment of capex) provides an effective sanction.

With those industries for which it may be easier to tie capital expenditure to specific outputs (water and rail for example), the UK regulators are endeavouring to provide incentives for efficient spending of capital by monitoring outputs, rather than by monitoring actual capital spending.

With both electricity and gas, the UK approach has been to adjust the regulator's initial forecast to actual expenditure for the purposes of rolling forward the regulatory asset base. This approach is taken to balance the interests of consumers, and also to provide the utility with the incentive to be efficient in its capital expenditure.

The Tribunal notes that OFWAT is currently proposing an approach similar to the third approach outlined above:

- for a five year period following the time when particular capital expenditures are expected to be incurred, the regulatory asset base will be rolled forward on the basis of the expected level of spending as long as companies have achieved the 'output' expected from that expenditure
- there will then (on a rolling basis) be a reconciliation with what has actually been spent, with actual spending being substituted for expected spending in the event that the actual spending is lower.

It is also noted that OFWAT undertakes benchmarking of capital efficiency at the beginning of a major review. If companies rank unfavourably in the benchmarking study, their capital expenditure forecast will be scaled down for the purpose of price regulation. This front-end scrutiny is possible due to a greater number of water and sewerage companies available for benchmarking against each other. It is noted that in the water industry it is probably easier to be more specific in terms of relating spending to outputs than, say, in the case of gas.

Capital related costs are the major portion of costs in infrastructure industries. Any improvements in the efficiency of capital expenditure may provide major cost savings. The Tribunal is mindful that it has to provide the right capital expenditure signals to regulated entities in terms of encouraging efficient investment, and that such incentives are in the long term interests of customers. However, the Tribunal must also needs to consider the interests of customers who will be paying for the new infrastructure through prices which may be higher than would otherwise be the case.

The Tribunal is mindful of the risks inherent when the regulator guarantees that capital expenditure 'signed off' will subsequently be accepted unconditionally into the regulatory asset base. The Tribunal seeks comments as to the most appropriate way in which to allow for capital expenditure in rolling forward the asset base.

3.6.2 Timing of recognition

The issue of the timing of recognition relates to the question of when the new assets should be recognised in the asset base. Should the assets be included in the year that they were commissioned, when the capital expenditure occurred, or when the assets actually came into productive service? Each scenario has its implications. For example, if the assets are recognised when the assets come into productive service, it will be necessary to capitalise the interest incurred on related debt up until that point.

In the UK, the regulators appear to have maintained a consistent approach of recognising new assets in the year in which the capital expenditure occurred. For modelling purposes,

OFFER, for example, recognises the expenditure halfway through that year. This appears to be the simplest and fairest approach.

Another issue in regard to the timing of the recognition of investment may arise where investment in additional capacity is very lumpy (ie the next increment in capacity is large relative to existing capacity). As a result, investment in new capacity to meet growing demand may result in apparent excess capacity. The extent and period of the apparent excess capacity will depend on, among other factors, the pace and volatility of load growth. Guidelines on optimisation procedures may reduce the possible risk arising from possible optimisation of the asset base and new investment should frequent optimisation be an important feature of the approach adopted to the roll forward of the asset base.

The Tribunal invites comments on whether capital expenditure should be included in the determination of revenues and prices in the year that it is incurred, and recognised as occurring midway through that year.

3.7 Regulatory accounts

The introduction of a regulatory asset base and depreciation distinct from that used for statutory accounting purposes can result in the need to maintain a separate set of so called, 'regulatory accounts'. The Tribunal is mindful of the time and cost involved in maintaining separate statutory and regulatory accounts.

Also important in this context is the issue of articulation whereby the charges against the profit and loss accounts need to be reflected in the balance sheet as well.

In the UK, the issue of regulatory accounts has at least two main dimensions:

- the articulation of regulatory decisions in regulatory accounts, and
- the links between regulatory decisions/accounts and financial accounts.

On the issue of articulation of regulatory decisions in regulatory accounts, the first question that needs to be asked is what function regulatory accounts are meant to be performing. In particular, are they meant to be a focused version of statutory accounts (with all that that implies for the rules for drawing them up), or are they meant to be, as some would prefer, a formalisation of the 'regulatory contract' between regulator and regulated company?

The paper by PricewaterhouseCoopers (Appendix 2) suggests that OFGAS seems to be leaning towards the latter view. Conversely, OFWAT wishes to keep regulatory values out of regulatory accounts. One element which is clear is that, with current regulatory approaches to RAB and its roll forward and with current accounting practice on asset valuation and depreciation, a choice must be made as to whether regulatory accounts link with statutory accounts or with the regulatory contract.

The main argument for linking regulatory accounts with the regulatory contract is to improve both the transparency and stability of regulatory decision making by providing a visible and formal audit trail for regulatory decisions.

The issue of articulating regulatory decisions in financial accounts is not a matter of regulatory economic principles. Financial accounts are meant to give a 'full and fair' view of a company's financial position. The issue, then, is how, and to what extent, regulatory decisions inform that view.

The Tribunal invites comments on these issues.

APPENDIX 1 EFFECT OF VARYING DEPRECIATION PROFILES

Effect of varying depreciation profiles
(based on 'Regulatory Value and the cost of Capital' by Geoffrey Whittington)

Asset and depreciation details

Opening current cost net asset value	\$500
Opening Regulatory Asset Base (RAE)	\$200
Regulated Asset Ratio (RAR)	0.4
Depreciation life (years)	20
Depreciation rate (per annum)	5%
Depreciation amount 1 (on \$200)	\$10
Depreciation amount 2 (on \$500)	\$25
Rate of return (say)	7%

Example 1					
Depreciation based on regulatory asset based (\$200)					
Years	Depreciation	RAB	Return	Total	
			on RAB	Revenue 1	
1	\$10	\$200	\$14	\$24	
2	\$10	\$190	\$13	\$23	
3	\$10	\$180	\$13	\$23	
4	\$10	\$170	\$12	\$22	
5	\$10	\$160	\$11	\$21	
6	\$10	\$150	\$11	\$21	
7	\$10	\$140	\$10	\$20	
8	\$10	\$130	\$9	\$19	
9	\$10	\$120	\$8	\$18	
10	\$10	\$110	\$8	\$18	
11	\$10	\$100	\$7	\$17	
12	\$10	\$90	\$6	\$16	
13	\$10	\$80	\$6	\$16	
14	\$10	\$70	\$5	\$15	
15	\$10	\$60	\$4	\$14	
16	\$10	\$50	\$4	\$14	
17	\$10	\$40	\$3	\$13	
18	\$10	\$30	\$2	\$12	
19	\$10	\$20	\$1	\$11	
20	\$10	\$10	\$1	\$11	
Total	\$200		\$147	\$347	
Net Present Value	\$106		\$94	\$200	

Example 2					
Depreciation based on opening current cost book value (\$500)					
Years	Depreciation	RAB	Return	Revenue 2	
	(on \$500)		on RAB		
1	\$25	\$200	\$14	\$39	
2	\$25	\$175	\$12	\$37	
3	\$25	\$150	\$11	\$36	
4	\$25	\$125	\$9	\$34	
5	\$25	\$100	\$7	\$32	
6	\$25	\$75	\$5	\$30	
7	\$25	\$50	\$4	\$29	
8	\$25	\$25	\$2	\$27	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
Total	\$200		\$63	\$263	
Net Present Value	\$149		\$51	\$200	

Rolling forward the regulatory asset base in UK utility regulation

Tim Tutton, PricewaterhouseCoopers

I Terms of reference

- 1 PwC was asked to prepare a short report which:
 - (a) summarises the UK regulators' approach (including MMC rulings) to rolling forward the asset base;
 - (b) provides a discussion on the advantages and disadvantages of the approaches adopted by UK regulators;
 - (c) specifically canvases the following issues associated with rolling the asset base forward:
 - (i) how should depreciation be treated; what value should be used (i.e. should depreciation be calculated on the regulatory asset base, optimised replacement cost or actual cost); whether any other adjustments are necessary;
 - (ii) whether the regulatory asset base represents the shareholder financial investments in the firm or the physical assets of the firm and the implications of this for depreciation and indexation of the asset base;
 - (iii) what are the criteria for including capital expenditure in the asset base and the timing for recognition of capital expenditure to be included in the asset base;
 - (iv) whether the components of the asset base should be indexed and how (e.g. general inflation index or asset specific index);
 - (v) the implications for the financial statements of regulatory decisions and accounts.

II Structure of the paper

2 This paper is structured as follows:

- (a) Section III summarises current regulatory practice in the main UK regulated industries in which roll-forward has been an issue; and
- (b) Section IV considers arguments for and against different ways of achieving roll-forward.

III Overview of current UK regulatory practice on roll-forward

3 Where industries have been privatised at significant discounts to book value (not least because pre-privatisation prices were insufficient to give an economic return on that book value), regulators have tried to achieve two potentially conflicting objectives, specifically:

- (a) the need for **new** investment to earn a rate of return at least equal to the regulated company's cost of capital; and
- (b) the need for the overall return on assets to be consistent with the basis on which the companies were privatised.

4 In principle, these two objectives could have been achieved (and, in the case of British Gas, were, for a time, achieved) by allowing two rates of return on net book asset values, specifically:

- (a) a rate of return on pre-privatisation assets consistent with the expectations of investors at privatisation; and
- (b) a full cost of capital rate of return on post-privatisation investment.

5 However, in practice, regulators have preferred to define a 'regulatory asset base' (a 'RAB'), on which companies would be allowed to earn one (cost of capital) rate of return. Also in practice, they have (retrospectively) derived the '**initial** RAB' (i.e. the RAB at privatisation) from the enterprise value (market capitalisation plus net debt) of the company in question in the wake of privatisation¹. This has typically involved either averaging the enterprise value over some period after privatisation or applying an uplift to enterprise value at the end of the first day's trading in the shares.

6 Across UK regulated utilities, RAB and its roll-forward have been relevant mainly to those industries which:

- (a) are regulated natural monopolies;
- (b) have been initially sold to private investors at substantial discounts to their current cost net book values; and
- (c) have had at least one price review since privatisation.

7 Industries which fit these criteria are:

- (a) electricity transmission and distribution;
- (b) gas transportation; and

¹ The main exception to deeming initial RAB on the basis of enterprise value in the wake of privatisation has been British Gas. Its initial RAB (or at least that of its network business, Transco) has been, in effect, derived from the company's enterprise value some five years after the company's privatisation.

- (c) water.

8 It is true that roll-forward issues have arisen with respect to BAA, the privatised airport operator, despite the company having been initially sold to private investors at a premium to current cost net book value². It is also true that RAB and its roll-forward **will** be a major issue for the rail network operator, Railtrack, during its first periodic review (which is due to be completed some time in 2000). However, as things stand, the main regulatory practice on RAB and its roll-forward pertains to the electricity, gas and water industries. It is these industries on which this paper focuses. The rest of this section considers each of these industries against the specific issues raised by IPART, as described in para 1 (c) above, i.e.:

- (a) how depreciation is calculated;
- (b) whether the regulatory asset base represents the shareholder financial investments in the firm or the physical assets of the firm, and the implications of this for depreciation and indexation;
- (c) criteria for including capital expenditure in the asset base and the timing of its inclusion;
- (d) indexation of the RAB; and
- (e) articulation of regulatory decisions in financial accounts.

Electricity transmission and distribution

Depreciation and incorporation of capital expenditure into the RAB

9 In the UK electricity industry, it is the **regulatory value** of assets against which regulatory depreciation (i.e. the depreciation which is allowed in setting price controls) has been calculated. (However, note that the Scottish companies' transmission and distribution pre-privatisation assets have been, thus far, treated as having regulatory values broadly equal to current cost net book values.)

10 The calculation method, for all electricity transmission or distribution businesses, other than Northern Ireland Electricity (NIE), has been to compute:

- (a) depreciation on **pre-privatisation** assets on the basis that these assets are a single asset which, at privatisation, had a remaining life equal to the deemed

² At the first BAA periodic review, RAB was not an issue. The Monopolies and Mergers Commission (MMC) and the Civil Aviation Authority (CAA) were content to set BAA's control on the basis of an allowed rate of return on current cost net book value, with current cost depreciation being treated as an allowable cost. However, between the first and second periodic reviews, the indices used by BAA to index its current cost gross book values (primarily construction cost indices) went into free fall, implying that replication of the earlier methodology would produce a major reduction in BAA's revenues. In the event, the MMC and CAA decided (in 1996) to base a new initial RAB on the current cost net book value at the time of the previous MMC report (1991) and to roll this forward by, first, indexing to RPI, second adding subsequent capital investment at the point incurred and, third, deducting depreciation, calculated as "BAA's depreciation figures based on historic cost asset values adjusted for RPI". This latter was seen as a proxy for depreciation of the regulatory value itself. (Source: Monopolies and Mergers Commission, BAA plc, June 1996, especially paras 2.153-2.154)

average remaining life of assets in existence at that time. Depreciation at both the last distribution review and the last National Grid Company (NGC) price review has been derived by simply dividing the relevant initial regulatory value by the appropriate remaining life figure;

- (b) depreciation on **post-privatisation** assets by dividing each successive year's investment by a deemed average life for the company's assets (normally 40 years), albeit with a straight line depreciation profile for NGC and a 'tilted' depreciation profile (3% per annum for the first 20 years and 2% per annum for the second 20) for the Regional Electricity Companies (RECs). Each of these variants reflected respective pre-privatisation practice³.

11 The **calculation method for NIE** has been different, reflecting the MMC report on the NIE price control⁴. The MMC objected to the method proposed by Ofreg (the utility regulatory body for Northern Ireland) who had, in turn, copied the Office of Electricity Regulation (Offer) method described in the previous paragraph. The MMC took the view that writing off pre-privatisation assets over the **average** remaining life of those assets was unfair as between present and future electricity consumers⁵. Instead, it recommended that depreciation should be profiled as for the companies book depreciation – but with the whole profile factored downwards to reflect the discount between current cost net book value and regulatory value at privatisation. It is important to note that this point relates entirely to the **profile** through time of allowed depreciation. It does not, in itself, affect the total amount of depreciation which will be allowed over the post-privatisation life of the relevant assets.

12 In deeming a company's RAB for the start of the next price control period, Offer adds:

- (a) the previous deemed RAB (i.e., for the first REC distribution review, the RAB at privatisation);
- (b) actual capital expenditure (less customer capital contributions) which has been incurred by the company since the previous deemed RAB; and
- (c) its own forecast of capex to be incurred through to the end of the next price control period⁶.

³ A published description of how 'Offer depreciation' works is given in the MMC's report on Scottish Hydro-Electric's distribution and supply price control – Monopolies and Mergers Commission, Scottish Hydro-Electric plc, May 1995, e.g. para 6.71 and Table 6.14.

⁴ Monopolies and Mergers Commission, Northern Ireland Electricity plc, March 1997

⁵ In other words, at privatisation in 1993, NIE had assets with remaining lives ranging from less than 1 year to well over 40 years – but with an average remaining life of 18.5 years. Writing them off, for regulatory purposes, over 18.5 years would have meant 'too much' depreciation having been allowed between 1993 and 2011, implying a cross-subsidy from customers between 1993 and 2011 to customers after that time.

⁶ Regulators have used their own forward-looking estimates of capex in setting price controls on the basis that companies have a clear incentive to overstate their capex requirements.

13 Further points which are worth noting about the methodology which has been used in electricity transmission and distribution are that:

- (a) capex is incorporated into the RAB in the year incurred. (For modelling purposes, all capex in a year is assumed to be incurred half way through the year.) It is not, for example, incorporated at the point in which an asset is commissioned (which would require the inclusion of interest during construction);
- (b) Offer could, in principle, disallow capex on the basis that it has been inefficiently incurred, but it has not, to date, done so; and
- (c) at least in the case of NIE's last price review, both Ofreg and the MMC made an adjustment in respect of NIE's under-spend of capex against the assumptions made at the time when the then current price control was set⁷.

Financial versus operating capital, and indexation

14 Implicitly, if not always explicitly, UK utility regulators have seen the regulatory asset base as representing shareholder financial investments in the firm, rather than as representing the physical assets or operating capability of the firm. This view has been reflected in:

- (a) the deeming of initial RABs in relation to the enterprise values in the wake of privatisation⁸; and

⁷ The general area of 'capex regulation' is outside the scope of this paper. However, the MMC has, both in the case of NIE and in the case of BG Transco, sanctioned the principle of 'partial clawback'. Under this, the NPV of the revenue allowed in respect of a proportion of capital under-spend (against assumptions made at the previous price review) is deducted from the NPV of revenue which would otherwise be allowed under the new price control. Partial clawback was chosen on the basis that, first, **total** clawback would encourage inefficient capex, second, **zero** clawback would encourage companies to over-estimate capex requirements and, third, the electricity and gas industries are industries where it is more difficult to specify the 'outputs' of particular capital programmes and, therefore monitor those outputs, rather than the expenditure itself. In those industries where it is easier to tie capex to specific outputs (water and rail for example), regulators are trying to move to incentivisation of efficient spending of capex through monitoring of outputs, rather than through monitoring actual capital spend. As noted in para 22, Ofwat is proposing to incentivise efficient capital spend through rolling forward the RAB on the basis of **predicted** capex for the a period, only replacing that figure with actual capex after that period, as long as specified capex outputs have been achieved. Within the water regime, the implication is that capital 'over-spend', i.e. spend in excess of that agreed with the Regulator, will be ignored (on the basis that the over-spend was due to inefficiency). Over-spend is due to be a major issue in the current review of Railtrack's price control. To date, over-spend has not been an issue in the energy industries.

⁸ In his second (1995) review of the RECs' distribution price controls, the Director General of Electricity Supply claimed to have based initial distribution RABs on enterprise value at the end of the first day's trading in REC shares, uplifted by 15%. At the time, Offer did not publish RABs for the individual RECs, but has recently published the 'range' of values which might be implied by this methodology in its first consultation paper for the forthcoming reviews of Public Electricity Supplier distribution and supply controls – Offer, Reviews of Public Electricity Suppliers 1998 to 2000, July 1998.

- (b) the indexation of regulatory values to the Retail Prices Index (RPI), rather than to asset-specific indices.

Implications of regulatory decisions and accounts for financial statements

15 This is an area in which electricity regulation is currently in something of a mess. A start to clearing up the mess is due to be made by Offer when it publishes (within the next few months) a much-delayed consultation paper on regulatory accounting.

16 The current position is that many of the RECs continue to carry distribution assets in both their main current cost accounts and their (current cost) regulatory accounts (which analyse their accounts between the separate regulated businesses) at depreciated replacement cost (where the equivalent gross book value has been derived by the application of asset-specific indices). This contrasts with the regulatory value of those assets which:

- (a) in the case of pre-privatisation assets, reflects the initial regulatory value, as increased by RPI indexation and as reduced by regulatory depreciation (described in para 10 above); and
- (b) in the case of post-privatisation assets, reflects initial cost, as modified by RPI indexation and regulatory depreciation.

17 Some RECs have been unwilling to write down assets to regulatory value, either in their regulatory or in their statutory accounts. This has been, at least partly, because of a belief that current cost accounts should reflect the costs of maintaining the operating capability of the businesses (i.e. the operating capital approach to current cost accounting, in contrast with the regulators' financial capital approach).

18 Against this, some auditors believe that application of current accounting standards requires such a write down, especially when there has been a take-over (as there has been for all but one of the RECs). The accounting standard 'Fair Values in Acquisition Accounting' (FRS7) effectively requires that, in the case of specialised industry assets like distribution system assets, assets should be valued at the lower of, first, depreciated replacement cost and, second, 'recoverable amount'. One definition of the latter is the NPV of an asset's future earnings. If certain additional (and rather restrictive) assumptions are made, recoverable amount can be identified with the regulatory value of the assets in question⁹. The ability of companies to avoid write-downs, without their accounts being qualified by their auditors, has depended on the views taken by the auditors. These latter have not been uniform.

19 The main results of the above have been that:

- (a) several RECs have had their accounts qualified in respect of the (current cost) carrying values of distribution assets; and
- (b) financial and regulatory accounts of most RECs bear little relation to regulatory reality.

⁹ Equating recoverable amount with regulatory value requires equating company's likely earnings with the regulator's assumptions about those earnings when setting the previous price control, i.e. assumptions about cost of capital, future capital expenditure, future reductions in operating costs and future growth of units distributed.

Water

Depreciation and incorporation of capital expenditure into the RAB

20 UK utility regulators currently adopt one of the following two approaches to depreciation and incorporation of capital expenditure into the RAB:

- (a) as with Offer above, allow only for depreciation of the **regulatory value of pre-privatisation assets** but allow **all new capital expenditure** (always net of customer capital contributions) to add to regulatory value; or
- (b) as with the Office of Water Services (Ofwat) for the water industry, **allow for the maintenance of pre-privatisation assets in full** (through a current cost depreciation charge for overground assets and an ‘infrastructure renewals’ charge for underground assets¹⁰) in setting price controls, **but only allow regulatory value to be increased in real terms to the extent that investment exceeds the current cost depreciation charge (for overground assets) or the current cost renewals charge (for underground assets)**. The effect of this approach is that only ‘net’ capital expenditure (i.e. expenditure net of current cost depreciation/renewals) earns a full cost of capital rate of return.

21 Both of these approaches produce the same net present value over the longer term when cash flows are discounted at the same cost of capital. However, they differ in that:

- (a) they produce different **profiles** of revenue through time. The Ofwat method will, other things being equal, produce a higher initial revenue but a slower growth in revenue through time. The Offer method will produce a lower starting revenue but faster growth through time; and
- (b) with the Offer method, regulatory value increases over time towards replacement cost, whereas the Ofwat method implies that regulatory value stays permanently below replacement cost.

22 Looking forward, Ofwat is proposing to modify the way in which capital expenditure is incorporated into the RAB. Specifically, it is proposing that companies retain the benefits of ‘capital efficiencies’ for a fixed period before they are transferred to customers. What is meant by this is that, if a company achieves agreed service standards while spending less

¹⁰ Estimates of allowed renewals expenditure (in respect of underground assets) are made by engineering consultants working for Ofwat. In addition, Ofwat has been reluctant, in practice, to allow full book current cost depreciation in respect of overground assets. This is because companies’ actual spend on the replacement of these assets has typically been far less than the depreciation charges. In setting price controls, Ofwat has therefore tended towards using an average of actual replacement spend over a number of years in calculating revenue to be allowed in respect of depreciation of overground assets. For the next water price control, Ofwat is planning to compare the net present value of current cost depreciation charges with the net present value of actual and expected capital maintenance spend over the period 1992/93 to 2014/15. If the latter is significantly below the former, and if “there are no clear explanatory factors, the Director will assume that base current cost depreciation used for setting price limits should be adjusted to be broadly similar to the amount of capital maintenance expenditure” (Ofwat, Setting price limits for water and sewerage services, The framework and business planning process for the 1999 periodic review, February 1998).

capital than anticipated (by the Regulator) at the periodic review, then the RAB will be rolled forward on the basis of the **anticipated** spend for five years. At the end of this (rolling) period, the RAB will be recalculated by the Regulator on the basis of **actual** spend. As now, and as with electricity (and gas), capital spend will be recognised in the year incurred, rather than, for example, when the relevant assets are commissioned. The rationale for this process is to give companies a stronger incentive to spend capital efficiently than with either:

- (a) a one-off substitution, at the periodic review, of actual for anticipated spend over the previous period; or
- (b) (a), combined with a partial clawback of ‘excess’ revenue allowed in respect of that period (with excess revenue being defined as the difference between, on the one hand, the revenue allowed in respect of anticipated capex and, on the other hand, the revenue which would have been allowed if the Regulator had correctly anticipated the company’s actual capex).

Financial versus operating capital, and indexation

23 As with Offer, Ofwat has used a financial capital approach to the RAB, as reflected in:

- (a) the calculation of initial RABs for the large water and sewerage companies on the basis of the their respective average enterprise values over the first 200 days after privatisation average; and
- (b) RPI indexation of RABs, although renewals and depreciation charges are subject to investigation of what companies need to spend to renew their relevant assets.

Implications of regulatory decisions and accounts for financial statements

24 Unlike some electricity companies, the main financial accounts for water companies are on a historical cost basis, at least in respect of overground assets. (Infrastructure or renewals accounting is applied with respect to underground assets). Current cost accounts are prepared for regulatory purposes, according to guidelines (‘RAG1’) laid down by Ofwat. In these latter, infrastructure accounting is again applied to underground assets, but gross overground asset values are revalued on a Modern Equivalent Asset basis as part of each periodic review (and, according to some water company accounts, in between reviews).

25 Unlike in electricity, auditors have not felt compelled to qualify accounts because of disparities between, on the one hand, net asset value in these accounts and, on the other hand, regulatory value. This is because, in the water industry:

- (a) auditors are required only to provide a ‘compliance’ opinion on the (current cost) **regulatory accounts** (i.e. to confirm that the accounts have been compiled in accordance with the requirements of RAG1), rather than to confirm that the accounts provide a ‘true and fair view’; and
- (b) **statutory accounts** are on an historical cost basis, and historical cost net book values have typically been below regulatory values.

Gas

Depreciation, incorporation of capital expenditure into the RAB, and indexation

26 For some years, the issue of regulatory depreciation of (the then) British Gas's network assets was bedevilled by the 1993 MMC report on British Gas¹¹. The problem with this report can be seen by putting its conclusions in the context of practice in electricity and water. As noted in para 20 above, the electricity and water regimes have different, but internally consistent, ways of handling depreciation and incorporation of capital expenditure into the RAB. Specifically:

- (a) the electricity regime works by allowing depreciation only on regulatory asset value but allows **all** new capital expenditure to be added to the RAB (and, therefore, earn a full cost of capital rate of return); and
- (b) the water regime works by allowing full current cost depreciation/renewals, but allows the RAB to be enhanced in real terms only to the extent that investment exceeds the renewals charge, in respect of underground assets, or the depreciation charge in respect of overground assets. In other words, only 'net' capital expenditure earns a cost of capital rate of return.

27 The effect of both of these methods is that (ex ante) a regulated company earns a return on its regulatory value equal to its deemed cost of capital.

28 The conclusion of the 1993 MMC report was that, in effect, British Gas should be allowed **both**:

- (a) full current cost depreciation; and
- (b) a full cost of capital rate of return on **all** capital expenditure.

29 The implication of this method was to allow BG Transco, during the period from 1994 (when it was first regulated as a separate business) to 1997, to earn an ex ante rate of return on its regulatory value in excess of its deemed cost of capital.

30 This position was corrected by the 1997 MMC report on the Transco price control¹². The conclusions of this for roll-forward of the RAB were that:

- (a) as with electricity, regulatory depreciation would be allowed only on the regulatory value of assets;
- (b) as with electricity, the capital expenditure to be added to the previous periodic review's RAB is:

¹¹ Monopolies and Mergers Commission, Gas and British Gas plc, September 1993.

¹² Monopolies and Mergers Commission, BG plc, May 1997.

- (i) actual capex which has been incurred over the previous price control period; and
- (ii) the regulator's forecast of capex to be incurred through to the end of the next price control period;
- (c) as with NIE, but unlike with the RECs, depreciation would be profiled as for Transco's book depreciation, but adjusted downwards to reflect the discount between regulatory value and book value;
- (d) RAB would be indexed to RPI (as against Transco's accounting practice of indexing to the cost of replacing the relevant assets); and
- (e) as with electricity, and as previously with Transco, all new capital expenditure would earn a full cost of capital rate of return.

Implications of regulatory decisions and accounts for financial statements

31 The precise accounting implications of the MMC's 1997 conclusions are still being worked through. The current position is that, in its 1997 statutory accounts, BG wrote down the value of Transco's fixed assets to their regulatory value, a write-down of £4.9 billion, to take account of its new price control. This was on the basis that (in the words of the BG plc 1997 annual report):

- (a) "Regulatory tangible fixed assets are included in the balance sheet at depreciated replacement cost or, where lower, the estimated value in use"; and
- (b) "The value in use represents the present value of expected future cash flows discounted on a pre-tax basis. Future cash flows comprise a five year business plan plus a projection in perpetuity, on the assumption that the price control formulae for future regulatory periods will be similar in form to the price control formula for the regulatory period commencing 1 April 1997."

32 However, there are continuing issues in articulating regulatory decisions in BG's accounts. Not the least of these is the treatment of indexation. As already noted, the MMC - and the Office of Gas Supply (Ofgas) - use RPI to index Transco's RAB for price control purposes, whereas BG's 'modified historic cost' accounting policies entail valuing network assets, at least in the first instance, at depreciated replacement cost (using asset-specific indices as the basis for estimating replacement cost).

Summary of current UK regulatory practice on roll-forward in electricity, water and gas

33 The 1997 MMC report on BG Transco's price control has removed the major internal inconsistency in a UK regulator's use of RAB roll-forward in setting price controls. What remains are:

- (a) two broad generic approaches (the Offer/Ofgas one and the Ofwat one) to calculating the way that RAB is added to (via capital expenditure) and subtracted from (via depreciation), although with:

- (i) differences between Offer and Ofgas as to how depreciation (especially of pre-privatisation assets) is profiled through time;
- (ii) greater emphasis in the Ofwat approach on incentivising capital efficiency through longer use of predicted capital expenditure, as against actual spend, in the roll-forward calculation;
- (b) general use of a financial capital approach to RAB and general use of RPI to index RAB through time (even though, as in water, revaluation of book asset values to take account of changes in replacement cost may affect allowances made for depreciation/renewals and for future capital expenditure in setting price controls);
- (c) general recognition of capital expenditure for inclusion in the RAB in the year in which that expenditure is incurred or expected to be incurred; and
- (d) a substantial deal of confusion on the articulation of regulatory decisions in regulatory and financial accounts in which:
 - (i) water companies are required to draw up regulatory accounts in a way which specifies a current cost valuation of assets different from regulatory value;
 - (ii) some electricity companies persevere with current cost net book values in their regulatory and statutory accounts (resulting, in some cases, in qualification of the accounts by auditors) and some show 'impaired' values (i.e. regulatory values); and
 - (iii) there are continuing discussions between Ofgas and Transco on the form and content of their regulatory accounts which do currently carry network assets at their regulatory value, as do BG's statutory accounts.

IV Advantages and disadvantages of the different approaches

34 This section analyses, where different methods have been chosen, some arguments for and against the different options and, where there is broad agreement on methodology, arguments as between the consensus and the rejected options.

Depreciation and incorporation of capital expenditure into the RAB

The high level choice

35 As noted above, the high level choice is between:

- (a) the Offer/Ofgas method of:
 - (i) allowing regulatory depreciation only against the regulatory value of assets; and
 - (ii) allowing all post-privatisation capital expenditure to receive a full cost of capital rate of return; and

- (b) the Ofwat method of:
 - (i) making full allowance for renewals/current cost depreciation in setting price controls; and
 - (ii) allowing only net post-privatisation capital expenditure (capital expenditure less renewals/current cost depreciation) to earn a full cost of capital rate of return.

36 Also as noted, both methods are consistent with setting price controls which allow a regulated company to earn an ex ante rate of return on its RAB equal to its cost of capital. Two of the main differences between the methods are that:

- (a) the Ofwat method will give a more front-ended loaded revenue profile; and
- (b) with the Offer/Ofgas method, regulatory value increases over time to replacement cost, whereas, with the Ofwat method, it will not.

37 As a result of the above, and other things being equal:

- (a) the Ofwat method will be more attractive:
 - (i) for industries which require heavy and immediate capital investment (as was true for the water industry in the UK at the time of its privatisation); and
 - (ii) where holding prices permanently below replacement cost will not cause unacceptable distortions throughout the rest of the economy. It is at least arguable that the relatively low price elasticity of demand for water makes water again a good candidate for the chosen method of setting prices for it in England and Wales; and
- (b) the Offer/Ofgas method will be more attractive if:
 - (i) the networks under consideration are mature network with current renewals and replacement requirements at or below their steady state level (as was true for both the gas and electricity transportation networks in Britain at the time of their respective privatisation); and
 - (ii) holding prices permanently below replacement cost will cause unacceptable distortions because of the price elasticity of demand for the goods and services involved.

Depreciation mechanics

38 As noted in para 33 above, one of the remaining differences within the Offer/Ofgas method of calculating depreciation is the **profiling** of depreciation through time. The current position is as follows:

- (a) **with respect to the RECs' distribution businesses and with respect to National Grid Company's transmission business**, Offer effectively treats all pre-privatisation assets as one generic asset with a remaining (accounting) life equal to the **average** remaining life of the individual assets. If

unmodified, this will have the effect that, for the purposes of setting price controls, pre-privatisation assets will be totally written off while many pre-privatisation assets are still alive in the company's books; and

- (b) **with respect to NIE and BG Transco**, depreciation of pre-privatisation asset is profiled as for the book depreciation of those assets, albeit that the depreciation is lower than book depreciation because of regulatory value of pre-privatisation assets being lower than current cost net book value.

39 The argument which the MMC used (in its 1996 report on NIE) for the latter method is that the Offer approach is unfair. This is because it involves present customers subsidising future customers. This is, in turn, because the latter will not be bearing the appropriate cost of assets which will be in the books when they have been fully written off for revenue setting purposes.

40 The main argument for the Offer approach, on the other hand, is that it is extremely simple for a regulatory body to model. In contrast, there are major conceptual and practical complexities in following the MMC's approach. Despite what the MMC has implied, the calculation cannot simply be about taking book depreciation and applying a 'MAR adjustment'¹³ to it. This is because, for example:

- (a) current cost depreciation for many of the companies is calculated after indexation of gross book values to replacement cost or its 'modern equivalent asset' analogue, whereas regulatory depreciation requires RPI indexation;
- (b) book depreciation in any one year will often involve a stack of detailed adjustments, including early asset write-offs, which will not be easily capturable by the regulatory body when setting a price control. In principle, as long as the company is not bearing the cost of stranded assets (and, in UK utility regulation, this has typically, albeit often implicitly, been the case), an unanticipated early asset write-off would then need to be retrospectively taken account of at the following price review; and
- (c) more generally, depreciation is inherently complicated to model. The financial model which Coopers & Lybrand built for Ofgas, as part of the last Transco price review, was hugely complex (as well as being simply huge), partly as a result of trying to model Transco's own depreciation calculations.

41 It would seem, therefore, that a reasonable balance between equity and complexity considerations could be achieved by:

- (a) starting with the Offer method, i.e. calculating annual regulatory depreciation of pre-privatisation assets as some determined fraction of initial regulatory value and assuming a given average life for post-privatisation assets; and
- (b) choosing a **profile** for the depreciation of **pre-vesting assets** which **broadly** matches the profile of actual current cost depreciation of those assets. (It is

¹³ MAR (market-to-asset-ratio) is defined as the ratio between regulatory value and current cost net book value. Depending on how the calculation is performed, MAR can refer to the ratio at privatisation or at the point of time at which regulatory depreciation is being calculated.

quite possible that, during the forthcoming distribution price review, Offer will re-open the question of regulatory depreciation profiles for pre-privatisation distribution assets.)

Use of actual and/or expected capital expenditure in roll-forward

42 Ofwat is currently proposing that:

- (a) for a five year period after particular capital expenditures are expected to be incurred, the RAB will be rolled forward on the basis of the expected level of spend as long as companies have achieved the ‘outputs’ expected (on the basis of advice from Ofwat’s engineering consultants) from that spend; and
- (b) there will then (on a rolling basis) be a reconciliation with what has actually been spent, with actual spend being substituted for expected spend in the event that the actual spend is lower.

43 The argument for this approach is that it gives companies a stronger incentive to spend capital efficiently than with, for example, the Offer approach which involves replacing expected spend with actual spend at the following periodic review (even if the spend has only just been incurred). This argument is probably right as far as it goes, although, with any incentive regulation of capital expenditure, a lot depends on being able to tie spend to the outputs of that spend. In the UK context, water and rail are probably sectors where specific capital spend can be more easily tied to the outputs of that spend than in gas and electricity.

Timing of the recognition of capex in the RAB

44 UK regulators have typically recognised capex for inclusion in the RAB at the point when the capex is incurred or expected to be incurred. Alternatives would be to recognise assets when commissioned or even when they were producing their target ‘outputs’. The main requirement in this area, as in many others, is for consistency. Specifically, consistency would require that:

- (a) recognition at the point of commissioning entails the inclusion of ‘interest-during-construction’ (at the deemed cost of capital) in the RAB; and
- (b) further conditionality (e.g. with respect to performance of the assets in question) be reflected in the company’s deemed cost of capital.

Financial capital and RPI indexation

45 As previously noted, UK regulators have typically followed a financial capital approach to setting price controls. In the cases of the electricity, gas and water regulators, this has been reflected both in the way in which they have estimated initial regulatory values and in their use of RPI indexation of that value.

46 This approach makes a lot of sense intrinsically, given the objective of allowing initial investors a reasonable forward-looking return on their (financial) investment. However, the main requirement here is, again, for consistency. If, for example, an operating capital (or even optimised deprival) approach was to be adopted, and the company exposed to the risk of existing assets being partly or wholly stranded by technical change or market developments, then this incremental risk would need to be reflected in the allowed rate of return on regulatory value. This is because, if the intention is to allow a given real cost of capital return

on investment, any real reduction in regulatory gross book value (because replacement cost is declining in real terms) will mean that allowing (in any one year) the given rate of return on net book value will lead to the lifetime return on the assets in question being below the given cost of capital.

Implications for financial statements of regulatory decisions and accounts

47 In the UK, this question has had at least two main dimensions, i.e.:

- (a) the articulation of regulatory decisions in regulatory accounts; and
- (b) the links between regulatory decisions/accounts and financial accounts.

48 **On the issue of articulation regulatory decisions in regulatory accounts**, the first question which needs to be asked is what function regulatory accounts are meant to be performing. In particular, are they meant to be a focused version of statutory accounts (with all that that implies for the rules for drawing them up) or are they meant to be, as some would prefer, an articulation of the ‘regulatory contract’ between regulator and regulated company?

49 At the moment, opinion would seem to be veering towards the latter view in Ofgas, whereas Ofwat seems to be firmly in the camp of keeping regulatory values out of regulatory accounts. Offer, which has hitherto shown little interest in the basis of regulatory accounts, is due to circulate a consultation paper on regulatory accounts. The only thing which is clear is that, with current regulatory approaches to RAB and its roll-forward and with current accounting practice on asset valuation and depreciation, there does have to be a choice between whether regulatory accounts link with statutory accounts or with the regulatory contract.

50 The main arguments for linking regulatory accounts with the regulatory contract are to improve both the transparency and stability of regulatory decision making through providing a visible and formal audit trail for regulatory decisions. BG, in particular, faces a potentially uncomfortable future because of the combination of RPI indexation of its RAB with steadily falling real asset replacement costs. The risk is that when, as is likely at some point, the RAB has a higher value than depreciated replacement costs, a future regulator will refuse to allow a cost of capital return on the higher number. Enshrining RAB in the regulatory accounts is one way of reducing this risk.

51 **The issue of articulating regulatory decisions in financial accounts** is not a matter of regulatory economic principles. Financial accounts are meant to give a “full and fair view” of a company’s financial position. The issue, then, is how, and to what extent, regulatory decisions inform that view. It is clear from, first, the articulation of RAB in BG’s ‘modified historical cost’ accounts and, second, the qualification of the current cost regulatory and financial accounts of several of the RECs that some UK auditors can see circumstances (i.e. when recoverable amount is less than depreciated replacement cost) when financial accounts need to reflect regulatory decisions. The issue has not been so pressing with respect to ‘unmodified’ historical cost accounts because historical cost net book values have (for water, gas and electricity companies) been typically below regulatory values.